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Estimating the Financing Required to Fulfill the Education Targets Set by Sustainable Development Goals (SDGs): A Sample Study of Punjab, Pakistan

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Abstract

The report of United Nations Development Programme (UNDP) regarding the progress made in achieving the Millennium Development Goals (MDGs) by Punjab, Pakistan claimed that the province veered in its journey to achieve the universal primary education targets. Past evidence showed that the shortage of funds was one among several reasons due to which school education targets of MDGs were not met. Countries all over the world have now signed up for another set of comprehensive Sustainable Development Goals (SDGs), which need to be achieved by 2030. At present, in Punjab, no attempt has been made to meet the targets set by SDGs. This study attempted to determine how much public spending is required to meet a subset of basic education goals, namely the completion of high-quality pre-primary, primary, and lower secondary education. This study only evaluated public spending on school education in Punjab. For this purpose, data was taken for the period 2008-2019. Based on the results, we must increase our education spending on school education by at least 10% in real terms, annually. Furthermore, if the recent trend of spending on school education continues, the rise in spending will only be 5% in real terms, due to which we will not be able to achieve school education related SDGs in Punjab, Pakistan. At this time, the best thing that the government can do to stimulate progress in school education targets of SDGs is to provide the amount of resources especially when the race towards the attainment of the SDGs is on in all developing and developed countries.

Keywords: expected years of schooling, financial requirements, linear regression, school education, Sustainable Development Goals (SDGs)

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Introduction

At present, Punjab has the largest sub-national school education system with more than 12 million students, 52,000 public sector schools, and 403,172 teachers (Report on Annual School Census 2017-18). After being devolved as a provincial subject under the 18th Amendment, several school education sector reforms and policies were introduced in Punjab under the Punjab Growth Strategy 2018, Punjab School Education Sector Plan 2013-18, and Chief Minister's School Reforms Roadmap. It aimed to improve the quality and quantity of educational indicators in the province. Punjab is the most densely populated province of Pakistan. The total population of this province is 111 million (Pakistan Bureau of Statistics, 2017), while the literacy rate of 10+ years is about 64.7% (Finance Department Pakistan, 2019). UNESCO (2003), although the literacy rate increased from 28% to 48% from 1981 to 1998 and 65% in 2019, the growth rate in literacy decreased from 3.04% to 1.53% between the years 1998-2019 (Pakistan Social & Living Standard Measurement Survey, 2018). About 27 million adults (age 15-24) in Punjab are still illiterate and 25% of children ages 5 to 14 do not attend school. Nonattendance at school is a severe problem in rural areas, especially for the female population (PSLM, 2018).

Although in the last some decades, the Punjab government focused on demand-side interventions in order to meet the demand of education in low-income areas. For this purpose, they also increased budgetary expenditures for school education (I-SAPS, 2015). Expenditure for school education in Punjab increased by 77% over the last 10 years (International Monetary Fund, 2016). However, the educational issue has remained constant over the last decade, with almost 10 million school-aged children out of school in 2016-17, from which more than 50% are female (AEPAM, 2017).

Due to the low enrollment rate and high rate of out of school children (OOSC), the progress in education, which was one of the most important goals set by Millennium Development Goals (MDGs), remained very slow (Ministry of Education, Government of Pakistan, 2013). One of the most important reasons behind the slow progress may be low funding (Naveed & Malik, 2012). The funding for MDGs was not enough to bring the

millions of out-of-school-children to school. In MDG 2, Punjab was likely to achieve only one-third of the universal primary education goal (UNDP, 2015). Although Punjab performed marginally better than other provinces in terms of achieving the MDG education metrics, it was mostly due to the prevailing gender equality and gender-equitable education system. However, due to inadequate planning, budgeting, and expenditure control within the education sector, the Punjab government's progress toward MDGs was severely hampered (Malik, 2011).

Following the Millennium Development Goals (MDGs) set in 2000, the Sustainable Development Goals (SDGs) were set to achieve a global development agenda from 2015 to 2030. With seven outcome targets and three modes of implementation, education is identified as a stand-alone agenda in the SDGs. The fourth Sustainable Development Goal (SDG 4) aims to "provide inclusive and equitable quality education for all, as well as encourage lifelong learning opportunities for everyone." Each of the targets include a brief description of the framework for action's core policy commitments. As a signatory of the UN declaration of SDGs, Pakistan is committed to achieve these goals. For this purpose, it needs to efficiently allocate its resources to achieve this target. Additionally, to achieve sustainable economic development, it is essential to invest a significant amount of resources in education. Government investment in education not only empowers and improves the livelihood of people but also results in the development of human capital, which is essential for economic growth and prosperity. An educated labour force can adapt to the latest technologies and is, therefore, more productive and economically beneficial.

The elasticities of the educational indicators and public spending indicated that consistent developmental and recurrent expenditures, especially in the education sector, can enhance the quality of student outcomes (Table 1). On average, the elasticities of "ratio of public expenditure at the primary level to total public expenditure" and "net enrolment of boys and girls at the primary level and the secondary level" are 0.035, 0.174, 0.198 and 0.224, respectively. Thus, public spending on education is positively associated with increased student enrollment. The same result was obtained in a study conducted by (Baker, 2012). Keeping

in view the importance of the use of public spending to enhance educational indicators, this study aimed to assess the overall amount of public funds required to meet SDG 4.1, which ensures that all girls and boys receive free, equitable, and high-quality primary and secondary education.

Table 1

Key Elasticities of Educational Indicators

To	With	Elasticity
Net Enrolment of Boys at the Primary Level	Ratio of Public Expenditure at the Primary Level to Total Public Expenditure	0.035
Net Enrolment of Girls at the Primary Level	Ratio of Public Expenditure at the Primary Level to Total Public Expenditure	0.174
Net Enrolment of Boys at Secondary Level	Ratio of Public Expenditure at the Primary Level to Total Public Expenditure	0.198
Net Enrolment of Girls at Secondary Level	Ratio of Public Expenditure at the Primary Level to Total Public Expenditure	0.277

Source: Authors Calculations

Research Focus and Objectives

This study focused on evaluating the financing required to meet the targets set by SDG 4 in Punjab, Pakistan. According to the "Punjab Free and Compulsory Education Act 2014," the government is required to provide every child with free and compulsory education from class one to ten. They are also required to offer non-formal education, vocational education, a combination of all, or any of the two after taking into account a child's needs, capability, and age. It ensures completion of education or specified education in a nearby school enrollment rate is 45% (Pakistan Social and Living Standardized Measurement Survey, 2018). Punjab has a 66% universal enrolment rate for children aged 5 to 9. The research aimed to estimate the cost of achieving/providing universal access to elementary

and secondary education in Punjab. The cumulative duration of primary level education lasts for 5-9 years, while, secondary level education lasts for around 10-14 years. The expected year of schooling per child was used as an indicator to quantify universal access to primary and secondary school education in Punjab.

Research Questions

Based on the research objectives described above, the following research questions were set to be analyzed:

a. What is the current level of expected year of schooling (primary and secondary) in Punjab?
b. How much money will be needed in the budget to achieve the targeted level of expected years of schooling for the coming year?

Review of Literature

Public spending is one of the most important factors that influence educational indicators. Although money alone may not be enough to improve the equity and adequacy of the outcomes of education indicators; still, the efficiency and efficacy of unbiased and adequate spending are essential. This study focused on evaluating the financing required to meet the targets set by SDG 4 in Punjab, Pakistan. According to Hedges et al. (2016), when per-pupil expenditure was increased in the United States, it positively influenced student success. Similarly, Ouedraogo (2018) also investigated the impact of education spending on primary school completion rates. The author estimated the parametric education production function using data from Burkina Faso from 1970 to 2013. The findings revealed that the unitary investment expenditure had a beneficial impact on the education index. Perry (2018) reported that increased investment in education is associated with better post-academic outcomes, particularly for students in the lower quintile. He also examined how increased spending in education boosted enrolment in several Texas school districts. Similarly, Carlson and Lavertu (2018) utilized a regression discontinuity methodology to investigate the impact of School Improvement Grants (SIGs) on student achievement and school administration. The findings revealed that Ohio's SIG considerably impacts the learning outcomes of pupils. According to the author, SIG

positively effects per-pupil spending, but there is no meaningful effect on administrative outcomes, such as staff turnover, the number of employees with a family member in the school, and school closure. Busemeyer et al. (2018) found that increasing expenditure on school and vocational education has a greater impact than increasing spending on higher education and early childhood education. The findings of the study also revealed that the citizens in some nations are willing to pay more taxes in order to fund education investments. Martorell et al. (2016) investigated that the government bears the cost of construction, repairing, and modernization of schools in billions. They found out that this investment positively impacts student outcomes. They studied the impact of nearly 1400 financial campaigns of schools and found that investments in school facilities improved student achievement rates. Khoman (2018) claimed that education spending is not only the cause but also the solution for the problem of equity and access in the education system. They used empirical data to analyze the education expenditure used to achieve the targets set by SDGs. This data reflected that due to the inequitable distribution of educational subsidies and income inequalities, the poor segment of society bore the burden of educational expenditures. To tackle this problem, the author suggested an increase in the resource allocation for education and better targeting of subsidies. Furthermore, it was also suggested that budgetary reforms should accompany innovative methods of service delivery to improve the efficiency of spending in education. Crampton (2009) used canonical analysis to find the impact of human capital as well as physical and social infrastructure investment on student outcomes. This analysis is a multivariate statistical approach, which can use multiple dependent and independent variables at the same time. For the years 2003, 2005, and 2007, the author collected data from national databases, including the National Assessment of Educational Progress (NAEP) and the U.S. Census Bureau. According to the findings of the study, human, social, physical and capital infrastructure accounts for 55.8% and 77.2% of the variation in student achievement in reading and mathematics in fourth and eighth grades, respectively. The benefits of education spending can also be determined from research evidence, which states that it not only increases the value of educational indicators of a province but also help achieve the targets of SDG 4 in Punjab.

Methodology

The analysis in this section is quantitative. Target 4.1 can be best embodied by the expected year of schooling. To calculate the expected year of schooling, the standardized formula used by UNESCO in Human Development Index (HDI) is used:

$$SLE_{a,t}^t = \sum_{i=a}^{n} \frac{E_{i,l}^t}{P_i^t} + \frac{E_{unknownage,l}^t}{SAP_l^t} D_l^t$$

$SLE_{a,t}^t$ = Sum of age-specific enrolment rates for a given level of education school life expectancy at age a for level l in year t

$E_{i,l}^t$ = Enrolment of the population at age i in level l in year t

P_i^t = Population of age i in year t

$E_{unknownage,l}^t$ = enrolment of unknown age in level l in year

SAP_l^t = school-age population for level l in year t

D_l^t = Theoretical duration of level l in year t

Linear trend analysis by using least squares regression was adopted to forecast the finance/budget required to reach the desired level of expected year of schooling. The same technique was used by World Bank to estimate India's financial requirements that are needed to achieve SDG 4. For this purpose, the following model is constructed for analysis:

$$EYS = f(TE + \varepsilon)$$

Where

Dependent Variable
EYS= expected year of schooling

Independent Variables
TE= Total expenditures incurred on school education
ε = Error term

Future budget expenditures were measured by using the following compound growth formula. The data was extracted by examining the past trends in public spending.

$$CAGR = (\frac{Ending\ Year\ Expenditures}{Beggining\ year\ Expenditures})^{1/Total\ number of Years} - 1$$

Subsequently, the gap was extracted by subtracting the forecasted values of expenditures from the future trend of spending.

Data Sources

The data, such as the annual public spending on school education, was gathered from a variety of sources including various financial reports provided by the Punjab Accountant General's office in Lahore. Data on the net and gross enrollment in various years was retrieved from several issues of the Pakistan Social and Living Standard Measurement (PSLM) Survey and Pakistan Education Statistics. PSLM was also used to obtain the age distribution of the sample population, while the representative population was derived from the census reports of 1998 and 2017.

Result

It was found that the total spending on education is 2% of the total provincial spending. The spending in school education increased from 25 billion in 2009-10 to 35 billion in real terms in 2018-19. Even after this increase in spending, the budgetary allocations for education are not translated into meaningful spending. In 2010-11, there was a 28% unspent budget, it slightly decreased to 26% in 2016-17. In terms of total real public expenditures, a 40% increase was observed in 10 years. The number of years that a child is expected to spend in school in the course of their life cycle with the current level of enrollment is also increased from 8.03% in 2009-10 to 8.48% in 2018-19. Given that children of age 5-14 complete their schooling in 10-year, the level of increase in the expected year of schooling remained very slow in the last ten year.

Total real public expenditures, which are essential to achieve the required level of outcome for SDGs 4.1, are given in Table 4. Total real

expenditures on school education was regressed against the expected year of schooling by using linear trend analysis. The targeted, expected year of schooling for each year was measured by the compound growth rate. The future population of the age group 5-14 was projected by calculating the compound growth rate of population from 2005-06 to 2016-2017. The total expenditure required to achieve the SDGs target 4.1 was calculated to be PKR 8,42,159 million. Furthermore, the previous trend in spending revealed that if the previous trend of spending in school education continues, then spending in school education would be increased up to PKR 529,907 million in 2029-30 on average. With this trend, the overall gap in spending in the next 11 years would be about PKR 312,252 million in real terms. It is also evident from analysis that every 1% increase in budget spending on the education sector increases years of schooling by almost 0.2% in Punjab.

Table 2

Public Sector Real Expenditures on School Education

Years	Total Spending Nominal (PKR Million)	Whole-sale Price Index (2010=100)*	Total real public expenditure (in 2010 prices)	Population aged 5-14 (Derived from Punjab Development statistics) (In Millions)	Per Capita Real Expenditures (In PKR)	Expected year of schooling
2009 -2010	21671	83.9	25830	27	948	8.03
2010 - 2011	20584	100.0	20584	28	739	8.07
2011 - 2012	23676	118.8	19924	28	700	8.25
2012 - 2013	18929	127.2	14873	29	512	8.15
2013 - 2014	28877	137.1	21050	30	709	8.28
2014 - 2015	26423	143.7	18384	30	606	8.08
2015 - 2016	32380	140.1	23111	31	746	8.17
2016 - 2017	52309	142.4	36720	32	1161	8.27
2017-2018	56379	147.3	38249	32	1184	8.39
2018-2019	63946	180.0	35523	33	1077	8.48

Source: Expenditures data obtained from financial reports of accountant general Punjab and expected year of schooling is calculated by using PSLM 2018 data

Table 3

Total Allocation vs Spending in School Education (in Pakistani Rupees)

Period	% expenditure to allocation	Un Spent Budget (%)
2010-11	72%	28%
2011-12	78%	22%
2012-13	90%	10%
2013-14	87%	13%
2014-15	85%	15%
2015-16	90%	10%
2016-17	74%	26%

Source: Data directly obtained by the finance department

Table 4

Estimate of Finance Required (Real MM PKR - 2010 base year)

	Projected population (in Numbers)	Expected Year of Schooling (Target)	Total Expenditures (MM PKR)	Trends in Public Expenditures (MM PKR)	Gap (MM PKR)
2019 – 2020	33683099	8.60	43531	37300	6232
2020 – 2021	34400549	8.72	49868	39165	10703
2021 – 2022	35133280	8.85	56298	41123	15175
2022 – 2023	35881619	8.98	62822	43179	19643
2023 – 2024	36645898	9.11	69119	45338	23781
2024 – 2025	37426455	9.24	75832	47605	28228
2025 – 2026	38223639	9.37	82312	49985	32327
2026 – 2027	39037802	9.51	89219	52484	36735
2027 – 2028	39869308	9.65	96228	55108	41120
2028 – 2029	40718524	9.79	103340	57864	45476
2029 – 2030	41585828	10.00	113591	60757	52833
			842159	529907	312252

Source: Author's Calculations

Conclusion

It is concluded that a significant increase in the education budget is required to achieve the target set by SDGs. The results of this study are in agreement with the studies conducted for Afghanistan, Lebanon, Malawi,

Nigeria (Steer, 2015), low income countries (Hoy, 2016), Africa (Nsapato, 2016), India (Steer, 2015), Bangladesh (Alam, 2018), and Afghanistan (Strand, 2015). Budget tracking exercises over the last few years also revealed that budget allocations for both recurrent and developmental purposes are underspent (Table 3). There may be adequate financial resources available to meet the SDGs, if all budget allocations are converted efficiently and effectively into meaningful spendings. There are a variety of factors that lead to underspending at the provincial level, but the most important factor is the ability of the officials to spend the given cash, which must be improved (I-SAP, 2014). Although, after the devolution of powers in the 18th amendment, both the education allocations and expenditure have been increasing in Punjab; however, not all the allocations are spent meaningfully. This underutilization of the budget adversely affects the implementation of government policies, programs, and projects.

Policy Recommendations

This research can be considered the first step in the financial assessment of SDG 4 in Punjab, Pakistan. Moreover, the financial estimates provided should be viewed as the minimum amount needed, since actual financial requirements may be greater or higher. Based on the findings of the current study, the following recommendations are made:

1. In addition to increasing the budget allocation for education, it is critical to analyze and address the causes of budget underutilization. In this regard, government officials should be trained to improve their capacity to fully utilize the assigned budget. Currently, sufficient budget is allocated to school education; however, budget spending is very low due to a lack of transparency, accountability, and efficient use of public resources. Thus, budget spending mechanisms should be improved overall.

2. Even though resources are available, officials lack the capacity to utilize them properly in order to achieve the desired results. For this purpose, the project Monitoring and Evaluation (M&E) system at the provincial level must be strengthened using the most effective instruments, so that

the government can ensure service delivery and translate resources into outcomes.

Limitation

The limitation of this analysis is that it only examined the financial allocation and spending of the last twelve years for which the data was available; therefore, the generalizability of the conclusion may be limited. To estimate the expected years of schooling, this analysis incorporated only the data obtained from primary and high/secondary schools. In the public sector of Punjab, there are no separate preprimary institutions. Additionally, higher secondary education is provided at the college level and a separate budget under the label of 'Higher Education' is allocated to higher secondary schools. For this reason, we excluded the preprimary and intermediate level education and estimated only the budget needed for the completion of primary and secondary school education.

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